DiGiGrid

IOC USER GUIDE

DiGiGrid

Table of Contents

Introduction 4

1. Getting Started 5

    1.1 System Requirements 5

    1.2 Registration 5

    1.3 Software Installation 6

    1.4 Licenses 6

2. Hardware 7

3. Suggested Uses And Configurations 9

    3.1 One Computer with a DiGiGrid IOC 9

    3.2 Adding More I/Os to Your System 10

    3.3 Adding a Server 11

    3.4 Multiple Computers with a Single DiGiGrid IOC 12

    3.5 HD Mix Room and Several Smaller Recording/Editing Rooms 13

4. Software Setup And Controls 15

    4.1 Device Firmware 18

        4.1.1 Resetting the Unit 18

    4.2 Identifying a Device from the SoundGrid Studio Device Rack 18

5. Control Panel 19
5.1 Controls Page 21
5.1.1 Top Bar 22
5.1.2 Analog Section 22
5.1.3 Digital Section 25
5.1.4 Clip Indication and Small Meters 26
5.2 Clock Page 27
6. Adding A Server To The Ioc 29
6.1 Applications of an External Server 30
6.1.1 eMotion ST Mixer 30
6.1.2 StudioRack 31
7. Moving Audio In A Soundgrid Network 32
7.1 Using an I/O Device with a DAW 33
7.2 Patching I/O to Driver and Driver to I/O 34
7.3 eMotion ST Mixer Patching 41
7.4 Device-to-Device Patching 42
7.5 Headphone Patching 43
8. Technical Specifications 44
8.1 Installation Notes 46

INTRODUCTION

Thank you for choosing the DiGiGrid IOC interface for SoundGrid systems. In order to get the most out of your product, please take some time to read this manual. We also suggest that you become familiar with our support sites, www.digigrid.net and www.waves.com/support, where you will find an extensive answer base, the latest tech specs, detailed installation guides, software updates, and current information about licensing and registration.

About SoundGrid and DiGiGrid IOC

SoundGrid is a scalable infrastructure that provides a variety of cost-effective, high-quality solutions for studio production. It can be configured in many ways, with many hardware possibilities, to provide a very flexible work environment. This framework is managed by the SoundGrid Studio Application, which configures the network, assigns and manages I/Os, controllers and servers, and patches audio throughout the system. Any user, anywhere on the SoundGrid network, has access to all available network I/O devices. Adding a SoundGrid DSP server enables processing and monitoring.

Perfect for the control room, the **DiGiGrid IOC** audio interface offers a wide range of connectivity options, including 2 mic/line inputs with broadcast-grade preamps, 8 line inputs/outputs, 16 AES/EBU inputs/outputs, and one ADAT 8-channel I/O, plus two powerful headphone outputs.

Connect the IOC to your SoundGrid network with a single Ethernet cable. DiGiGrid IOC can be used as your primary audio interface, or as an additional I/O expansion to an existing SoundGrid system.

Add a SoundGrid DSP server, and you'll be able to run hundreds of SoundGrid-compatible plugins, fully integrated within your DAW, with incredibly low latency.

1. GETTING STARTED

Aside from setting up your microphone preamps, there's not much you need to know to begin working with your IOC.

1.1 System Requirements

- SoundGrid Studio running on a Mac or PC (consult the Waves website for current OS and DAW compatibility).
- Compatible native DAW (Logic, Cubase, Nuendo, Ableton, Pro Tools Native, and many more). A list of SoundGrid-compatible hosts is available at the Waves website.
- IOC / SoundGrid Studio software installed on the host computer.
- Cat 5e or Cat 6 Ethernet cables.

1.2 Registration

To download IOC software you will need to register your device at www.digigrid.net or www.waves.com. You must know the serial number of your IOC in order to register it, so sign up before you mount it in a rack. The serial number appears on a label on the bottom of the unit or on a sticker on the box.

Once you register you will receive two emails:

- A notification that you can now download the installer.
- Instructions about authorizing your license.

1.3 Software Installation

After you register your new IOC, you can download the installer from the Download/Hardware Drivers section of the Waves website. Since SoundGrid enables you to access an I/O device from any computer in the network, you will need to install the software on each computer in the network.

The IOC installer consists of:

- The IOC I/O hardware driver.
- The SoundGrid ASIO/Core Audio driver, which serves as a bridge between the DAW and the SoundGrid network.
- The SoundGrid Studio Application, which manages all SoundGrid network resources and assigns devices to computers.
- StudioRack, a software plugin rack, or chainer, that hosts up to eight plugins and can move their processing from the DAW to an external SoundGrid server such as the one built into the DiGiGrid IOS interface. (External server is not included with the IOC.)
- eMotion ST, a software mixer that provides low-latency plugin processing and monitor mixing (requires an external server).

1.4 Licenses

DiGiGrid I/O devices do not require a license to operate in a SoundGrid network. However, certain advanced features, such as using StudioRack and eMotion ST for low-latency monitoring, or offloading processing from the host CPU, require a server and a SoundGrid license. This license is included with the purchase of IOC.

When you register your device, the relevant licenses are deposited in your Waves account. Use the Waves License Center application to activate your licenses and install them on your computer or on a USB flash drive.

2. HARDWARE

DiGiGrid IOC is a 1U rack-mounted device. Aside from headphone jacks, all connections are on the rear panel.

IOC Front Panel

Front panel LEDs indicate the status of essential device functions for each channel.

1. Input clipping — Red = clipping (level can be set through the control panel)
2. Input signal present — Green = signal present
3. 48v phantom power — Orange = ON
4. Network status indicator
   Blue: Device recognized by the SoundGrid network
   Red (flashing): Device not recognized by the SoundGrid network
   Yellow: Updating
   White: Unit malfunction (e.g., firmware did not load properly, unit did not boot properly)
   Cycling through colors: This LED is used to identify the unit from the control panel
5. Power switch/indicator
6. 2 ¼-inch TRS headphone jacks with individual volume control knobs
   8–600 ohms; gain = OFF to +15 dB

IOC Rear Panel

1. Mains input: 90–240 V AC 50/60 Hz
2. Built-in 1GB Ethernet switch, two ports
3. Recovery/reset button

Analog Connections

4. 2 mic/line inputs (combo XLR/TRS connectors)
5. 8 line in (DB25 8-channel balanced connector)*
6. 8 line out (DB25 8-channel balanced connector)*

Digital and Clock Connections

7. 16 AES/EBU I/O (2x 25-pin DB25)*
8. 1 ADAT I/O (8 channels @ 48 kHz; 4 channels @ 96 kHz)
9. Clock in and out (BNC connectors for external Word Clock)

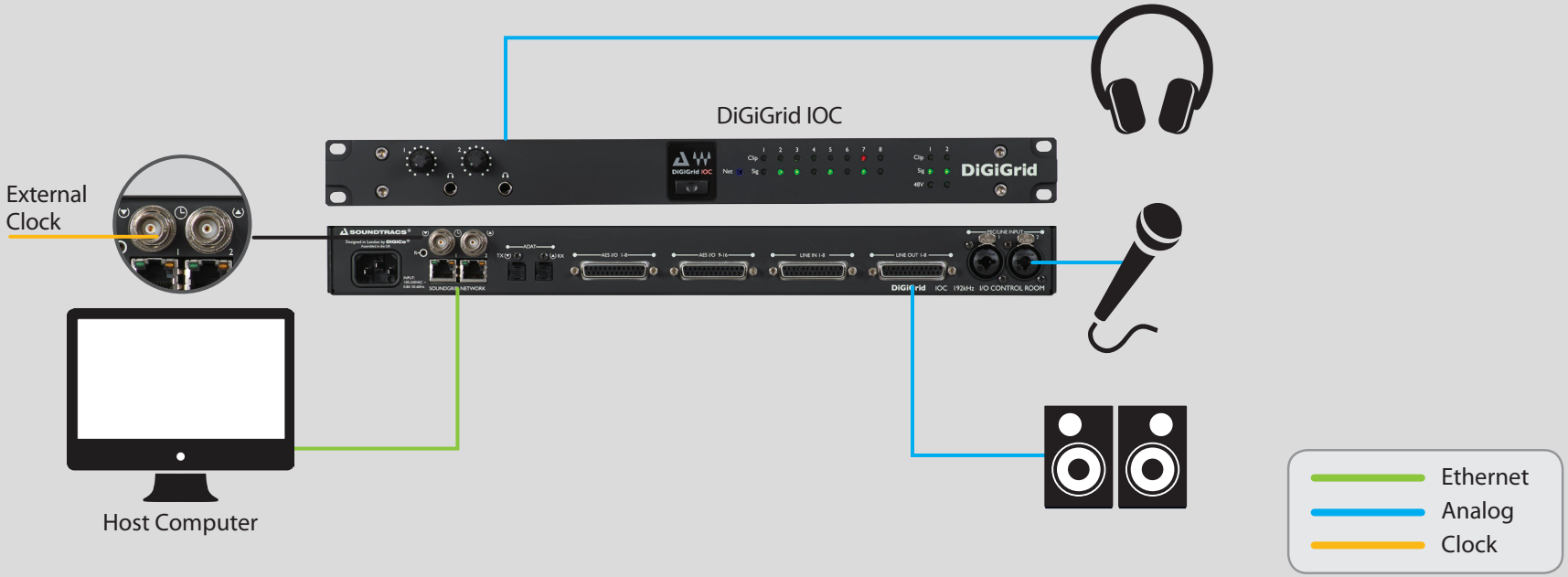
* See the Connections diagram in the Technical Specifications section at the end of this user guide.

3. SUGGESTED USES AND CONFIGURATIONS

There are many ways to use your DiGiGrid IOC. Your existing (or future) equipment, how you work, and what you need to accomplish are factors to consider when incorporating an IOC into your studio. Project studios with one or two DAWs can share I/O resources. Studios with several rooms and many DAWs can stream audio between rooms and quickly swap out devices. But no matter how simple or complex your setup is, connecting an IOC involves only one cable, an Ethernet Cat 5e or Cat 6.

3.1 One Computer with a DiGiGrid IOC

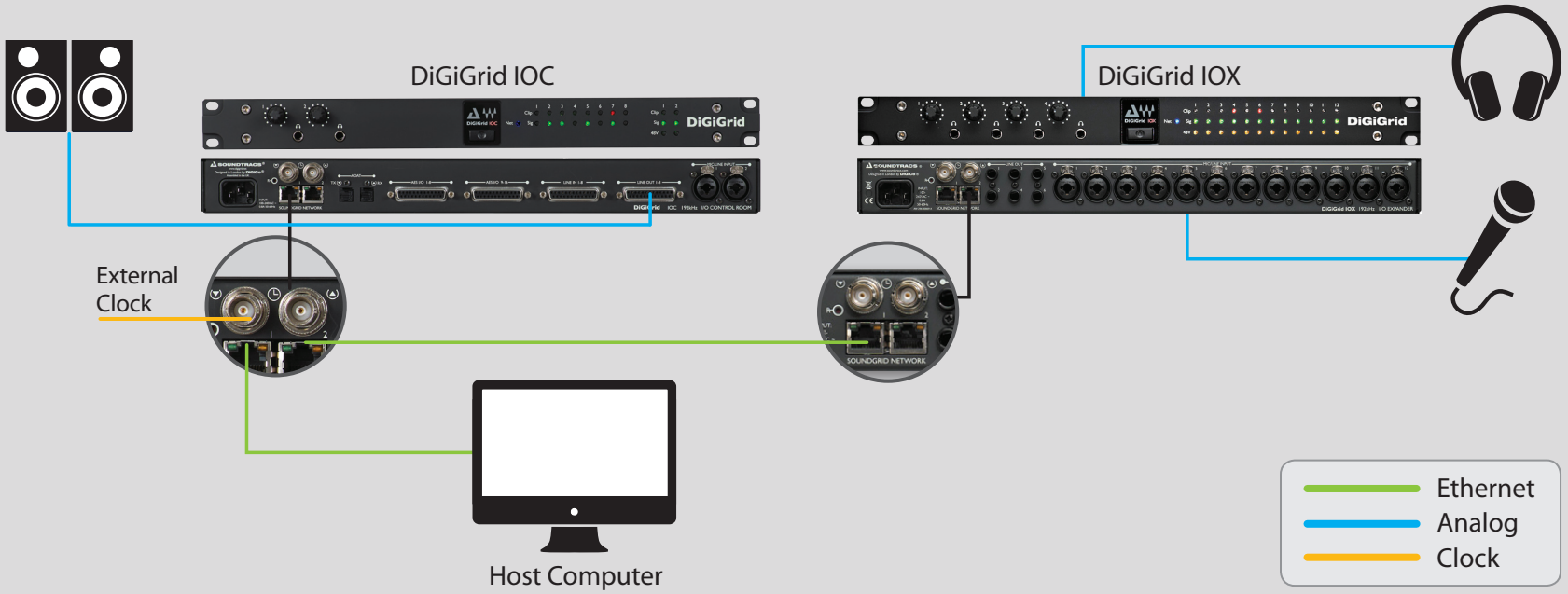
This is the most basic studio configuration. It includes a host computer with a native DAW and a single DiGiGrid IOC that connects microphones, instruments, headphones, and monitors to the SoundGrid ASIO/Core Audio driver. This driver controls the network and all its devices.



3.2 Adding More I/Os to Your System

Add a DiGiGrid IOX and you pick up another 12 mic inputs, 6 line outputs, and 4 more individual headphone outputs. Connect the IOX to the built-in Ethernet switch on the rear of the IOC. You can add up to eight SoundGrid I/O devices to a single host. Each of these can be accessed by any computer on the network.

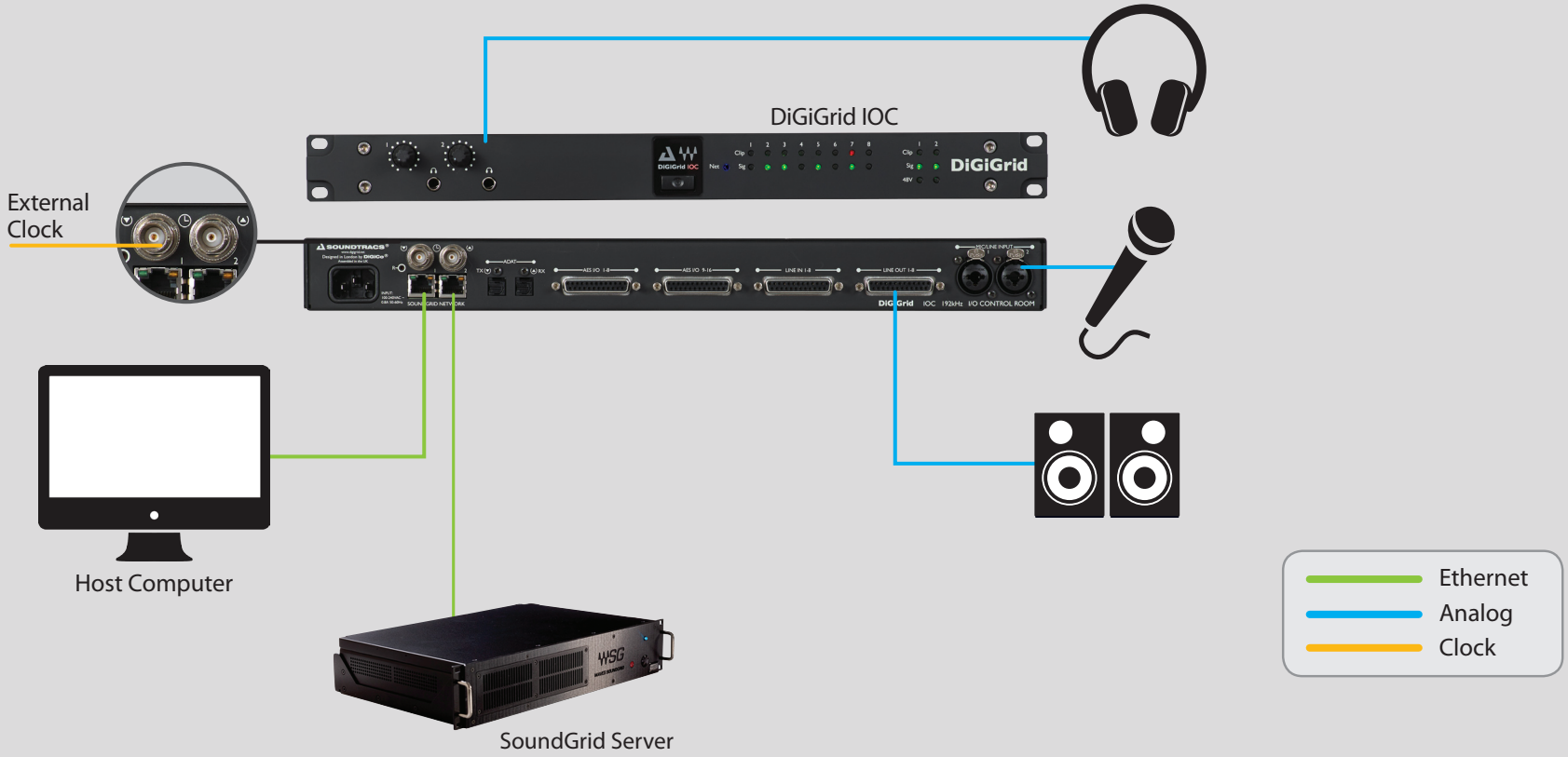
Audio and clock pass through the same Ethernet cable. This means of distributing clock is called "Sync over Ethernet" (SoE) and is used between all SoundGrid devices. To clock the entire network to an external clock source such as house sync, use Word Clock or Digital In as clock master for the IOC. If the IOC is the SoE master, the entire network will be locked to this external source.



3.3 Adding a Server

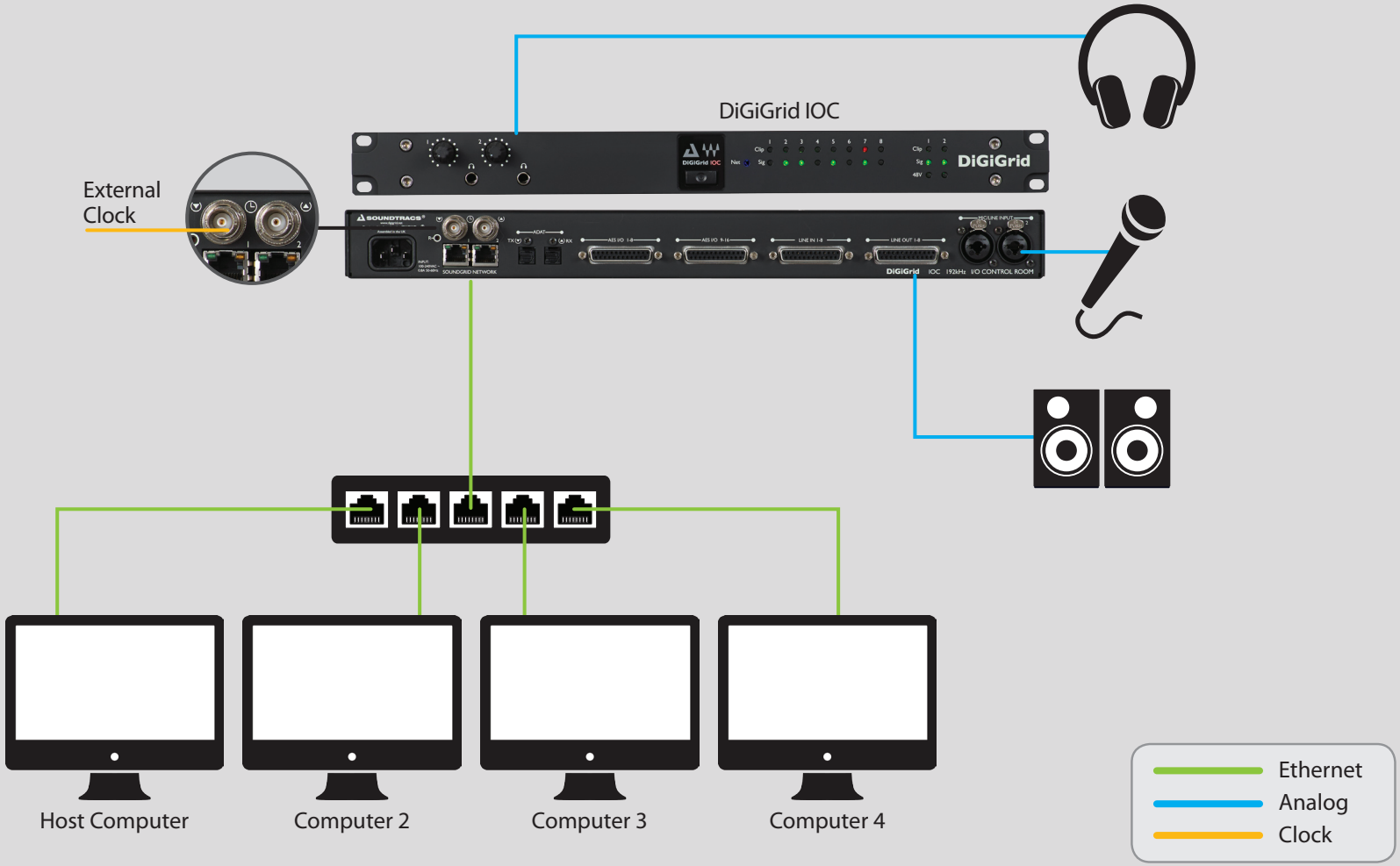
Adding a SoundGrid DSP server to a SoundGrid Studio system provides the processing power for the eMotion ST mixer and the StudioRack plugin. This enables low-latency recording and monitoring, and increases the number of plugins you can use simultaneously.

Some DiGiGrid I/O devices are equipped with internal servers. With these devices, the server will appear under the Servers section and the I/O under the Rack A: Hardware I/O Devices section. Configure these I/Os as you would any similar I/O device. All servers initially appear as "SGS." Once assigned, a server can be renamed.



3.4 Multiple Computers with a Single DiGiGrid IOC

If you want to stream audio between several computers in order to combine multiple mixes or elements, connect several DAWs to one IOC interface. Each DAW can send and receive an audio stream, and any one computer can control the I/O. Any native DAW—or combination of different native DAWs—can be a part of this network, so each computer must have the IOC software installed. Two computers can be connected to the DiGiGrid IOC Ethernet switch via a single Cat 5e or Cat 6 Ethernet cable. If you want to add further computers, you will need to connect them to an approved external 1GB Ethernet switch.



3.5 HD Mix Room and Several Smaller Recording/Editing Rooms

Let's say you need lots of channels of audio between the control room and the live room. And you need flexibility.

- You want to be able to easily add I/O devices without significant configuration changes.
- Your studio is part of a large facility, and you'd like to have access to available I/O devices throughout the facility.

Inventory

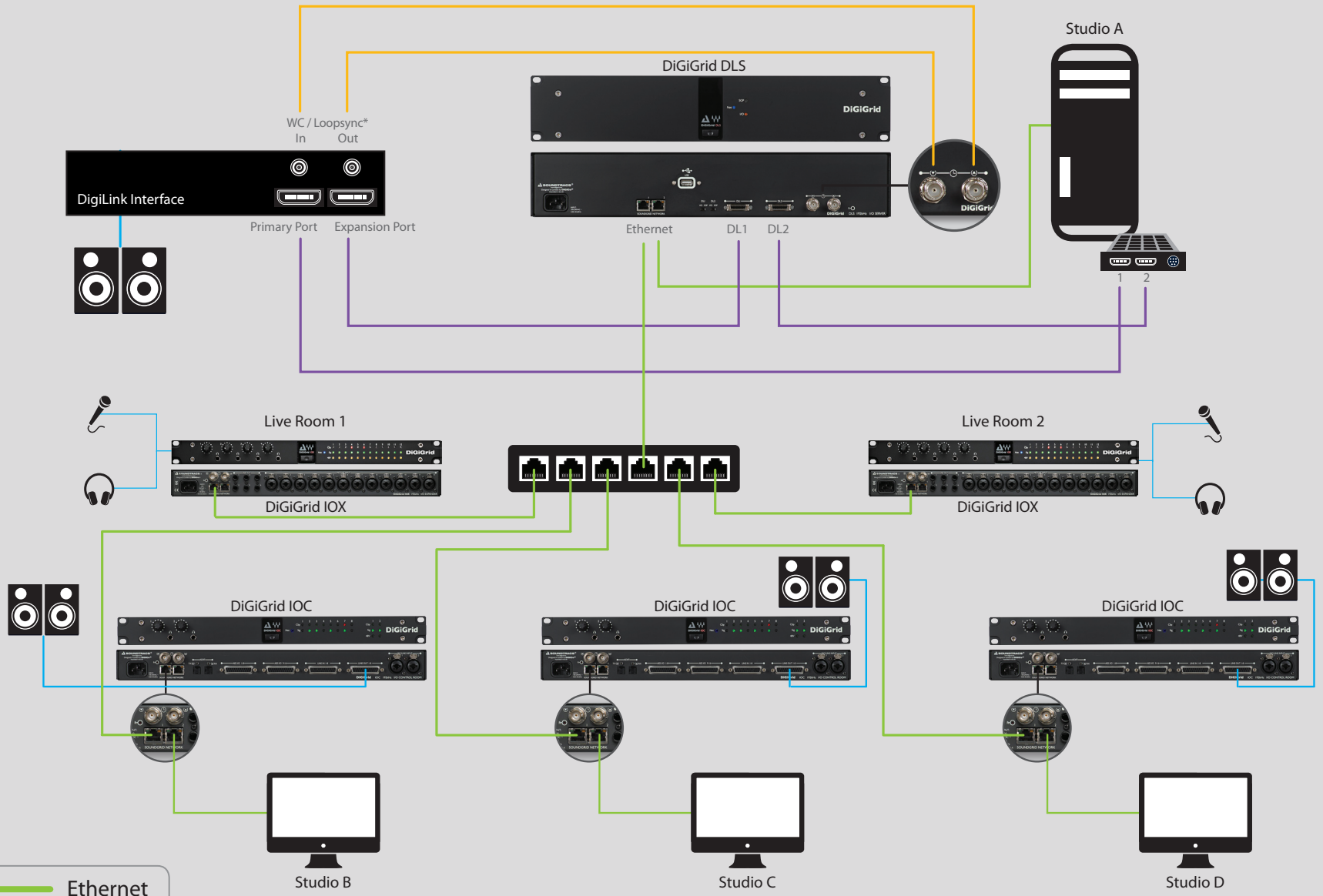
- Three IOC I/O devices
- Pro Tools HD/HDX or HD Native system
- Avid HD I/O (96, 192, Omni, etc.)
- Two IOX I/O devices
- 1 GB network switch

In this configuration, you have four control rooms: Room A with a Pro Tools HD system, and Rooms B, C and D each equipped with a DiGiGrid IOC. Each system can operate independently and take control of the IOX placed in the live rooms. In addition, any one system can control any or all of the I/Os: for example, the Pro Tools HD system has access to any or all of the three IOCs. The SoundGrid Studio Application is used to manage all the hardware I/Os on the network and to connect them to the software I/Os (ASIO/Core Audio drivers) or to the physical I/Os.

The live room is equipped with two input-rich DiGiGrid I/Os. This results in a large number of lines between the live room and the control room over a single Ethernet Cable.

The DLS serves as a bridge between a SoundGrid network and the control room's Pro Tools HD. Once this link is established, Pro Tools can access any device on the network.

HD Mix Room and Several Smaller Recording/Editing Rooms



* Dependent on Clock Mode setting in the DLS/DLI control panel

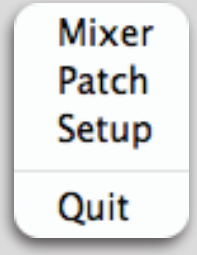
4. SOFTWARE SETUP AND CONTROLS

A SoundGrid network is managed by the SoundGrid Studio Application. This application assigns and removes devices, oversees the network, patches between devices, and provides access to device control panels.

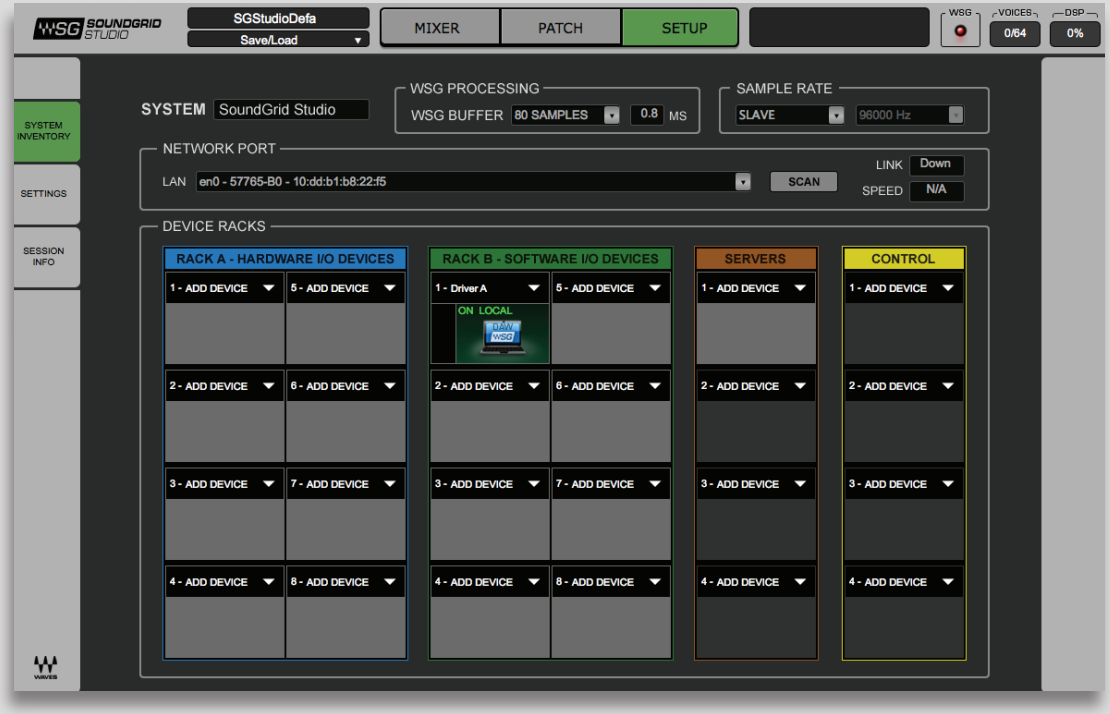
To maintain network effectiveness, the SoundGrid Studio Application always runs in the background. Bring SoundGrid Studio to the front by clicking on the SoundGrid icon in the Mac Top Bar or the Windows System Tray.

PC

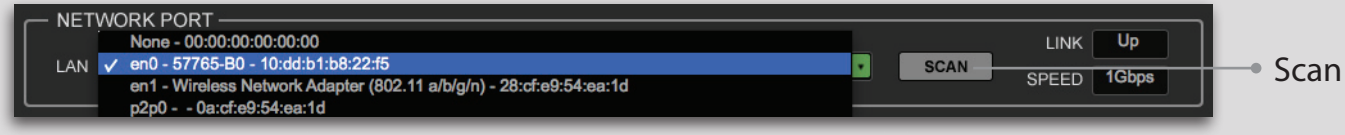
Mac

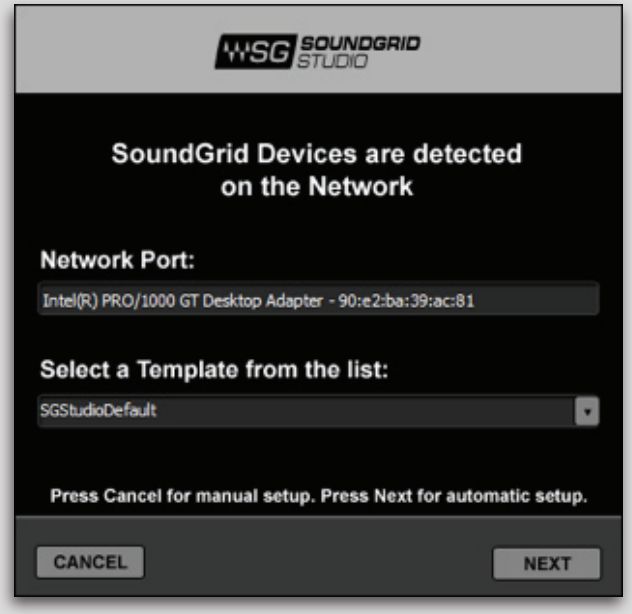


When SoundGrid Studio opens you will see the System Inventory page, which is part of the Setup section.



The first time you launch SoundGrid Studio, the Wizard will open. It scans the network, inventories its assets, and then configures the devices. If the Wizard does not start automatically, click the Scan button, which is located next to the Network Port window.



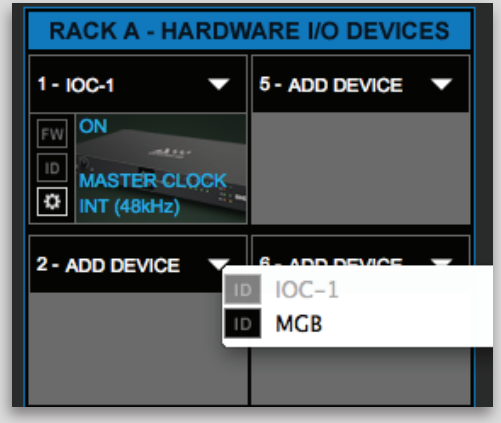

SOUNDGRID STUDIO
SoundGrid Devices are detected on the Network
Network Port:
Intel(R) PRO/1000 GT Desktop Adapter - 90:e2:ba:39:ac:81
Select a Template from the list:
SGStudioDefault
Press Cancel for manual setup. Press Next for automatic setup.
CANCEL
NEXT

Once it has scanned the system, the Wizard will offer to configure the SoundGrid network. A drop-down menu provides a list of configuration templates. Choose a template that best describes your hardware devices and production needs. You can save and load your own templates. Choose "NEXT" to start automatic configuration. This will take a few moments. Choose "CANCEL" to configure manually.

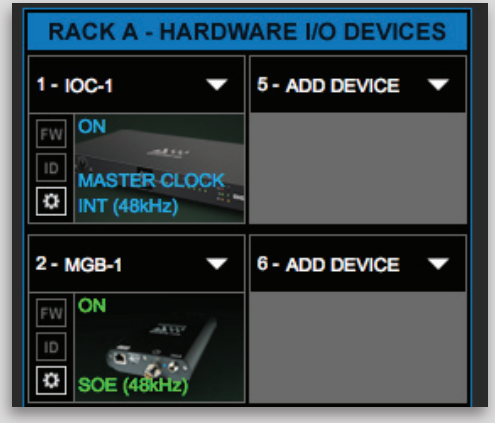
If the Wizard cannot locate the requested SoundGrid network devices, this means you may have chosen an incorrect network port on your computer. Check the physical connections, then click SCAN. When configuration is complete, close the window. If there's still a problem, you can use the System Inventory page to assign devices, control the network, and manage clock. To learn how to use this page, please refer to the SoundGrid Studio Application user guide.

SoundGrid Studio uses Ethernet to stream audio between devices on a SoundGrid network. Clock synchronization is also carried over Ethernet. This method of providing clock is called Sync over Ethernet (SoE). SoundGrid I/O devices can clock by other means as well, but SoE is by far the most common (and convenient) way to provide clock information to network devices.

In the SoundGrid Studio Setup page, you will see racks containing all of the devices assigned to your system: physical and virtual I/O devices, drivers, and servers. Each I/O rack slot displays the device's mode, clock status, and sample rate. In this example the IOC is the SoundGrid network's clock master device, indicated by its blue color and the icon text: On, Master Clock, INT (48 kHz).



To add another SoundGrid device, click on the arrow in an empty rack slot. From the list of available devices, choose the one you want to add, in this case a DiGiGrid MGB coaxial MADI interface. In this image the IOC is grayed out, signifying that it is unavailable since it is already claimed (in this case by you).



The new device is visible in the rack slot. Unless changed by the user, it remains a clock slave and is colored green. Use the same menu to change the clock master assignment from one device to another or to remove the device from the rack slot.

4.1 Device Firmware

Firmware is a small program that runs on a device in order to control it. It enables IOC to communicate correctly with SoundGrid Studio. An I/O that is using outdated or incompatible firmware will not work properly in a SoundGrid network until its firmware is updated. To see if your IOC firmware is compatible with the version of SoundGrid Studio that you are currently running, go to the System Inventory page and locate the device. Next to each device slot is a button labeled FW, whose color indicates firmware status.

Gray	Compatible firmware
Blue	Compatible firmware, but a newer version exists
Red	Firmware not compatible and must be updated in order to use

Click on the FW button to launch the firmware updater, which will initiate a scan of the hardware and then offer options. Do not disconnect the device or turn off the computer until you see "Done." After updating, turn the IOC off and back on to reset the device.

4.1.1 Resetting the Unit

If an unsuccessful firmware update results in the IOC no longer being recognized by MultiRack or SoundGrid Studio (the IOC device is not showing in the inventory panel), you can use the Reset button to try to recover the unit.
The Reset button is on the IOC rear panel.

- Turn off the unit.
- Press and hold the Reset button.
- Restart the unit while holding the button.
- Release the Reset button once the device has fully booted.

The unit is now in "force update" mode, and a new firmware update can be performed.

4.2 Identifying a Device from the SoundGrid Studio Device Rack

Just below the FW button is an ID button. Clicking on this button activates LEDs on the front panel of the hardware device. This serves the same function as the Identify button on the Control Panel Top Bar.

5. CONTROL PANEL

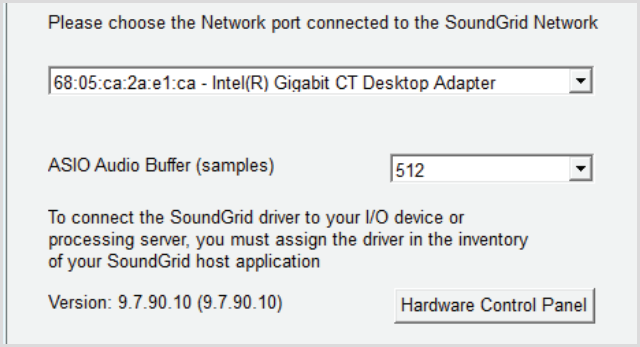
Access the IOC Control Panel by clicking on the Gear symbol in the SoundGrid Studio Device Rack.

From the IOC Control Panel you can manage:

- Clock settings: source, sample rate, type, clock status
- Microphone preamp controls: input gain, phantom on/off
- Output levels

In addition, there are input and output meters.

Pressing the "Hardware Control Panel" button on the Driver Control Panel app will open the control panels of all I/O devices assigned to your SoundGrid application. If none are assigned, nothing will happen.


Please choose the Network port connected to the SoundGrid Network
68:05:ca:2a:e1:ca - Intel(R) Gigabit CT Desktop Adapter
ASIO Audio Buffer (samples)
512
To connect the SoundGrid driver to your I/O device or
processing server, you must assign the driver in the inventory
of your SoundGrid host application
Version: 9.7.90.10 (9.7.90.10)
Hardware Control Panel

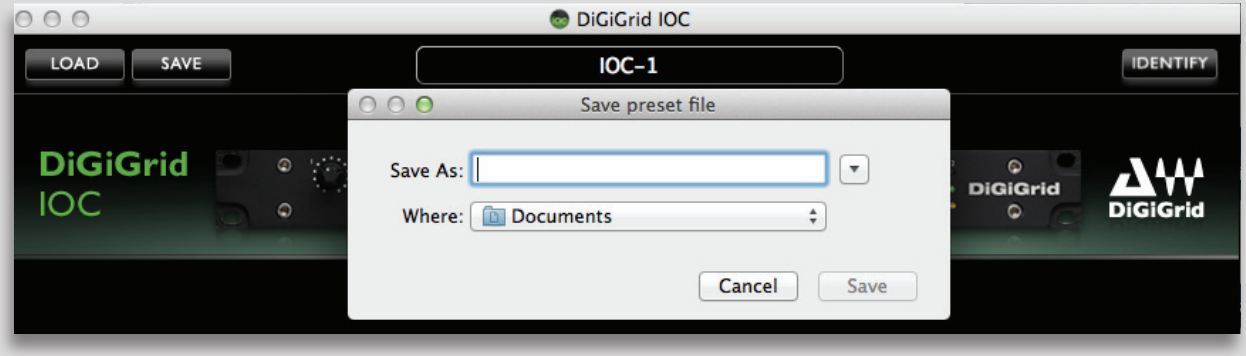
The Driver Control Panel app is located here:
PC: C:\Program Files (x86)\Waves\SoundGrid\Driver Control Panel
Mac: System HD/Applications/Waves/SoundGrid

Top Bar

At the top of each Control Panel page is a banner used to load and save device presets and to identify device hardware.

Use the Identify button to determine which IOC hardware device belongs to this Control Panel. Clicking the button causes the Network LED on the front panel of the IOC to flash in a rather psychedelic manner.

You can save and load presets of device settings.
A saved preset includes all Clock and Control panels parameters. Use IOC presets to use on future sessions or copy them to another computer to duplicate a configuration.



To save a preset, click the Save button and choose a name and path.

Loading a saved preset is equally obvious. Device presets are also saved as part of a SoundGrid Studio Application session. Refer to the SoundGrid Studio Application user guide for more information.

There are four pages on the IOC Control Panel:

The About and System Info pages provide information about the unit, such as MAC address, SoE master MAC Address, firmware version, and more. The Clock and Controls pages are used to set up and manage the IOC.

5.1 Controls Page

This is where you configure the IOC inputs and outputs, including mic preamps, line inputs and outputs, digital I/O, level control and metering.

The Controls page is divided into five sections:

1. Top Bar
2. Analog section
   (a) 2 mic/line combo
   (b) 8 line in + 8 line out (DB25)
3. ADAT I/O section
4. AES/EBU I/O section
5. Focus section: Analog input and output levels are controlled from here.

5.1.1 Top Bar

The Top Bar of the Controls page includes an illustration of the IOC rear panel. When an input or output is selected in the main section of the page, the corresponding connector is highlighted.

5.1.2 Analog Section

There are 2 mic preamps, 8 line inputs and 8 line outputs. Select a channel and it will appear in the Focus section.

Analog Input Controls

Use the Focus section to set preamp levels and turn the 48v phantom on and off.

The long meters range from -80 dBFS to 0 dBFS

Mic/Line knob gain range: 0 dB to 52.5 dB in 7.5-dB steps

Fine knob digital gain range: 0 dB to 7 dB in 0.5-dB steps

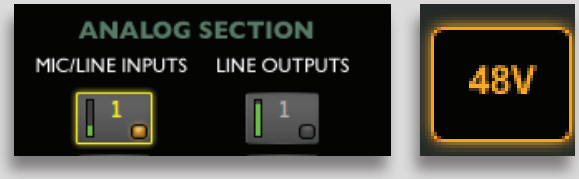
A clip indicator holds for two seconds or for as long as clipping persists.
Peak hold persists until you reset it by clicking on the indicator or switching to a different input.

From the main Control window of the I/O Control Panel, you can control the Preamp levels through the text value windows. This lets you quickly control any preamp without selecting the specific channel box.

There are three ways to control this level:

1. Click hold Drag up or Down
2. Double Click for Text Entry
3. Mouse wheel - by Pressing Command (Mac) / Control (PC) you can change these values using Mouse wheel.

Note: this text window will "combine" the Preamp and Fine control as one.
An orange light on a channel button indicates that phantom power for that channel is active.



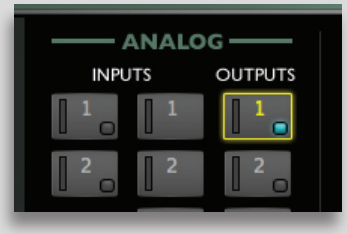
You can also control preamp functions from SoundGrid applications such as the eMotion ST mixer.

Control	Function
48v Phantom	On/Off
Preamp Gain Input	Controls analog gain in an attached I/O device that includes a controllable preamp.
Input Polarity	Mono channels have one polarity reverse button. Stereo channels have two. Buttons are latching and are colored green when engaged.
Digital Input Trim	Controls input level from digital sources. Separate controls for L/R when input is stereo.

This allows you to control preamps "on the fly," without leaving your monitor mixer. eMotion ST also provides a digital trim for incoming digital signals. Refer to the eMotion ST user guide to learn how to integrate the IOC with the eMotion ST mixer.

Analog Output Controls

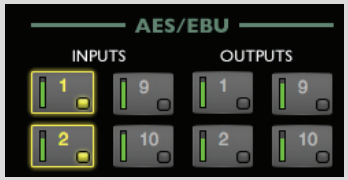
In addition to meters and clip and peak indicators—which are identical to the input controls—there is a Headroom switch that provides a -10 dB pad.



Presence of the -10 dB pad on an analog output is indicated by a blue light.

5.1.3 Digital Section

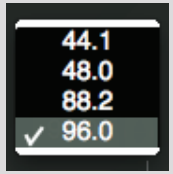
There are two types of digital inputs/outputs for you to select from: AES/EBU and ADAT. Upon selection, a higher-resolution meter will appear in the Focus section.



In the AES/EBU section, sample conversion rate (SRC) can be selected independently for inputs and for outputs.

The inputs and outputs are each divided into two groups: 1-2 and 3-16. Each group is internally linked, such that changing the sample rate for Input 1 will also change the sample rate for Input 2; changing the sample rate for Output 3 will also change the sample rate for Outputs 4-16; and so on.

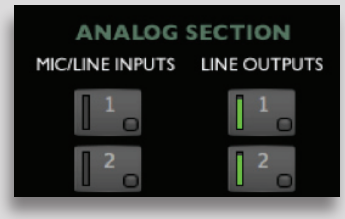
Inputs: To gain access to the SRC button, select any of the AES/EBU inputs. Use the SRC button to enable input sample rate conversion. When SRC is selected, the IOC converts the incoming digital stream to the sample rate of the clock to which the device is locked. A yellow light on the channel button indicates that sample rate conversion is active for that channel.



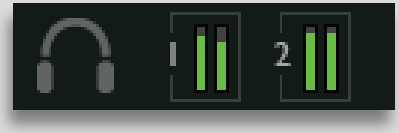
Outputs: To gain access to the SRC button, select any of the AES/EBU outputs. Once you select SRC, you can also choose any of the following sample rates: 44.1, 48, 88.2 or 96.

5.1.4 Clip Indication and Small Meters

Clip Indication Threshold sets where the clipping is indicated on the meter in the Focus section. This allows you to monitor levels in the way you find most comfortable. The threshold can be set to 0 dB, -1 dB, -2 dB, or -3 dB. This setting is global, not channel-specific. When Clip Indication Threshold is set, this behavior affects level indication for all channels, input and output.

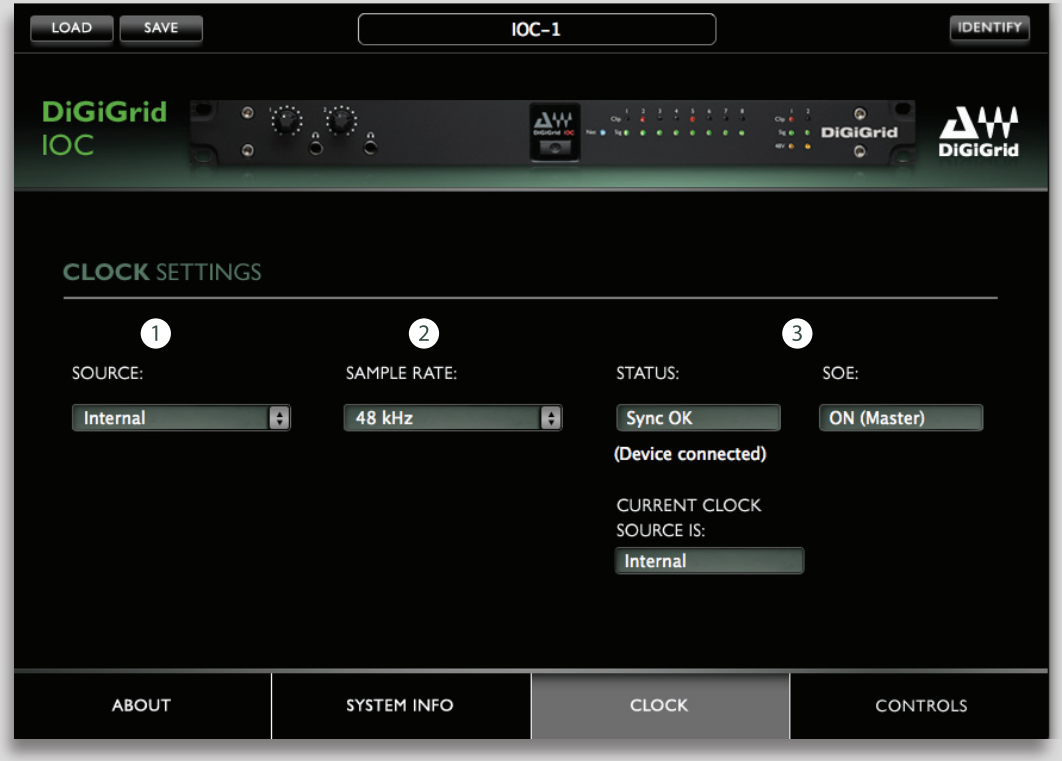


Additionally, each channel button—analog or digital, input or output—has a small level meter that indicates signal and provides a rough idea of level. A red light on the channel button indicates clipping.



5.2 Clock Page

Use the Clock page to set the clock source and sample rate for the device and to assess clock status. Clock controls are on the left side of the page; status indicators are on the right.



1 **SOURCE** sets the clock source

Internal	The interface itself provides the clock.
External WC	Clock is provided by an external device via the IOC Word Clock Input connector
Sync over Ethernet	Word clock is transmitted between SoundGrid devices using Ethernet
AES/EBU CH1	IOC clocks to an incoming AES/EBU stream

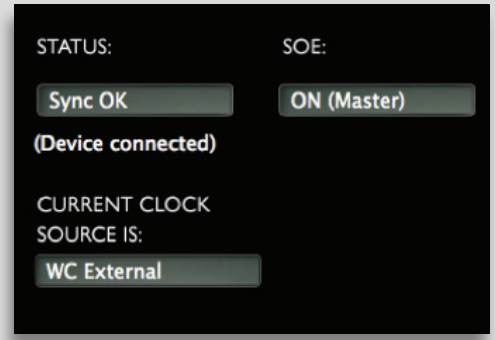
2 SAMPLE RATE sets the sample rate when Clock Source is set to Internal. Range: 44.1 / 48 / 88.2 / 96 kHz.

When Clock Source is set to Internal, you can use the Sample Rate menu to control the clock of the IOC device. If the IOC is the network (SoE) clock master, as determined in the Device Racks of SoundGrid Studio, then this setting determines the sample rate of the SoundGrid network.

If Clock Source is set to an external clock source, you cannot change the sample rate. The Sample Rate menu is grayed out and inoperative.

3 CLOCK STATUS INDICATORS

Three windows on the right side of the Clock control panel help you to quickly assess the network status of the IOC.



STATUS	Reports the presence or absence of sync between the IOC and the SoundGrid network.
CURRENT CLOCK SOURCE	Displays the current sync method. This may differ from the choice made in the Source menu.
SOE	Indicates whether this IOC is the master or a slave in the SoundGrid network. This mirrors the status information in the SoundGrid Studio Device Rack

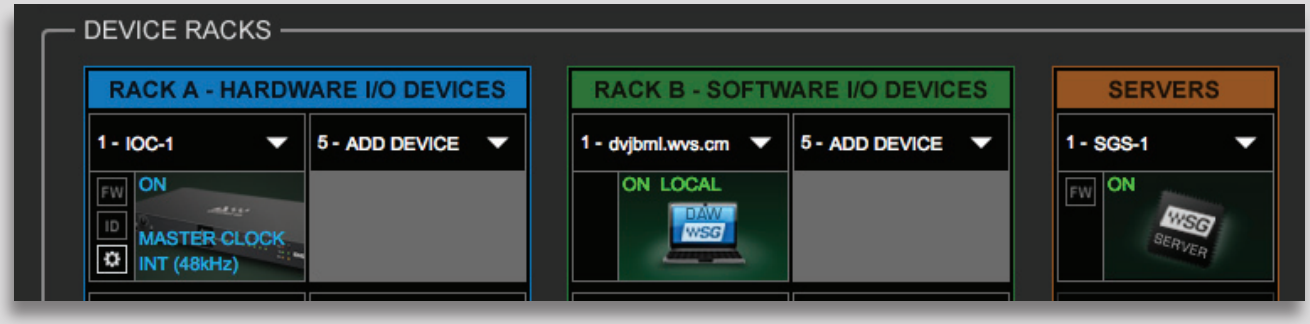
When the IOC is a slave in the SoundGrid network, you will likely sync it to the SoundGrid network clock (via SoE).
Even when the IOC is an SoE slave, you can lock it to an external clock source. For example, if another SoundGrid I/O device is the SoE master and is locked to a word clock device, you may choose to receive clock from the external device over word clock rather than via network SoE.

In the event that the selected clock source fails, IOC has a series of clock fallback layers, in this order: SoE, WC, AES Internal.

If an IOC is clocked to WC and this external source fails, it will first try to clock to SoE. If that is not successful, it will fall back to AES, and so forth.

6. ADDING A SERVER TO THE IOC

When you connect a server to the host computer and run the SoundGrid Studio Wizard, the server is assigned and configured for the host. Normally that's all you need to do. The server appears in the SoundGrid Studio Server rack, and the IOC is seen in the Hardware I/O rack.



To assign, free, or rename a server, click on the arrow to reveal the list of available servers, select a server from the list, and remove or assign the server.

A server cannot be shared by multiple SoundGrid host applications such as SoundGrid Studio or MultiRack. Within a SoundGrid network, only one computer can utilize a server's processing power for StudioRack and the eMotion ST mixer. Once assigned to a computer, a server remains unavailable to all other computers until released by the user. For further details, refer to the SoundGrid Studio Application manual.

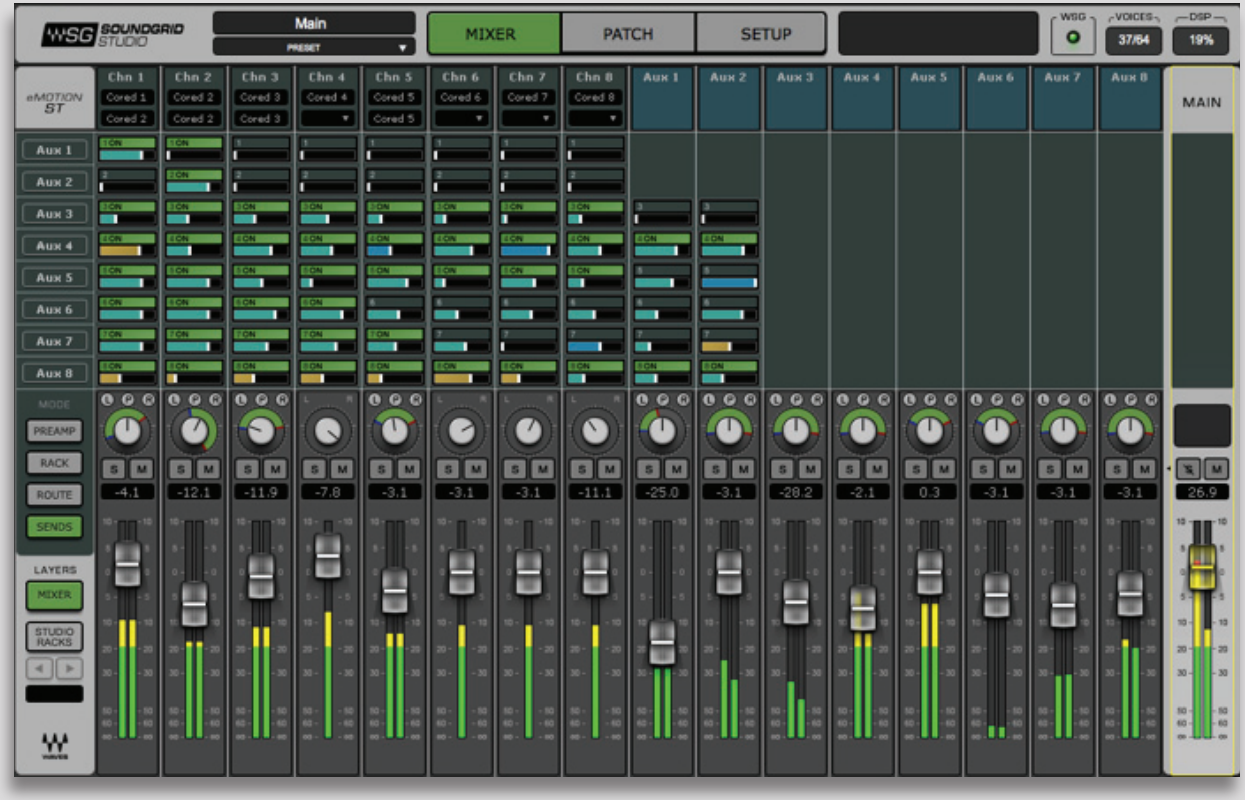
6.1 Applications of an External Server

The external server gives you access to advanced features for mixing, processing and monitoring.

6.1.1 eMotion ST Mixer

eMotion ST is the mixer element of the SoundGrid Studio System. It lets you run SoundGrid plugins in low latency for monitoring while recording. The eMotion ST mixer enables you to create personalized monitor mixes, with plugin processing done pre-, post-, or in parallel with your DAW. eMotion ST combines 8 channel inputs with up to 64 StudioRack plugins. Each input or StudioRack channel can be sent to aux tracks or a main mix.

You can set up and control the IOC preamp from eMotion ST, so you never have to leave the mixer to adjust microphones.



For further information, refer to the eMotion ST user guide.

6.1.2 StudioRack

StudioRack is a plugin chainer for any DAW. It hosts up to eight plugins, controls them, assigns them to external controllers, and manages them—with their presets—all in a way that makes it easy to move from one DAW session to another and from one DAW platform to another. It enables users to create racks of processors with limitless parameters and flexible signal flows, which are easily inserted into any track of the session.

When part of a SoundGrid network with a SoundGrid DSP server, StudioRack can shift plugin processing away from the local CPU and direct it to the SoundGrid DSP server. StudioRack works in conjunction with the eMotion ST mixer to create numerous personalized monitor mixes that use the same plugins heard in the mix—all with virtually no latency.

For more information, please refer to the StudioRack user manual.

7. MOVING AUDIO IN A SOUNDGRID NETWORK

You've configured the network and set up the IOC preamps. One last thing to do: Integrate your hosts into the SoundGrid network so that you can send audio to and from devices and listen to it. In order to do this, the audio must be patched from one point to another.

Audio must be patched because SoundGrid is a scalable and very flexible network—you can connect any combination of items: a device channel, the eMotion ST mixer, another driver (that is, another computer), or a mix of these. Plus you can change your configuration at any time.

Most of the time you don't need to think about patching. When you first set up a SoundGrid network or change its physical inventory, the Wizard automatically sets up your devices and establishes the patches. Still, you should know how to patch between devices, drivers, and applications. Then you can take advantage of the flexibility of a SoundGrid network.

There are three types of SoundGrid Patch page connections:

- Patch I/Os to drivers in order to connect with a DAW. The driver "speaks the same language" as the OS or DAW, so it serves as the intermediary between the I/O and the DAW.
- Patch directly to the eMotion ST mixer. This application "speaks the same language" as the IOC, so this connection bypasses the SoundGrid driver altogether.
- Patch two or more devices to each other to split signals to several hosts. This serves the purpose of a multi-connector or tie line.

7.1 Using an I/O Device with a DAW

When using a DAW on a SoundGrid network, the SoundGrid ASIO/Core Audio driver serves as a bridge between DiGiGrid IOC and the DAW. It enables the I/O to communicate with the DAW, and it provides patch points for connections. Using the driver and routing audio through it involves two steps: patch between the I/O and the driver; then select the correct driver in your DAW as the playback engine.

Selecting the Number Of Channels

When you configure your host application, you can allocate between 32 and 128 driver channels. This is done in Rack B of the Setup page. The number of channels you select here is reflected in the Patch page: fewer allocated channels means fewer channels visible.

Pick a number that only slightly exceeds the maximum total number of driver channels you will be using. There's no harm in selecting all 128 channels, but it may make the Patch page unwieldy.

Select Auto to match the number of driver channels to the maximum I/O count available on the assigned interfaces.

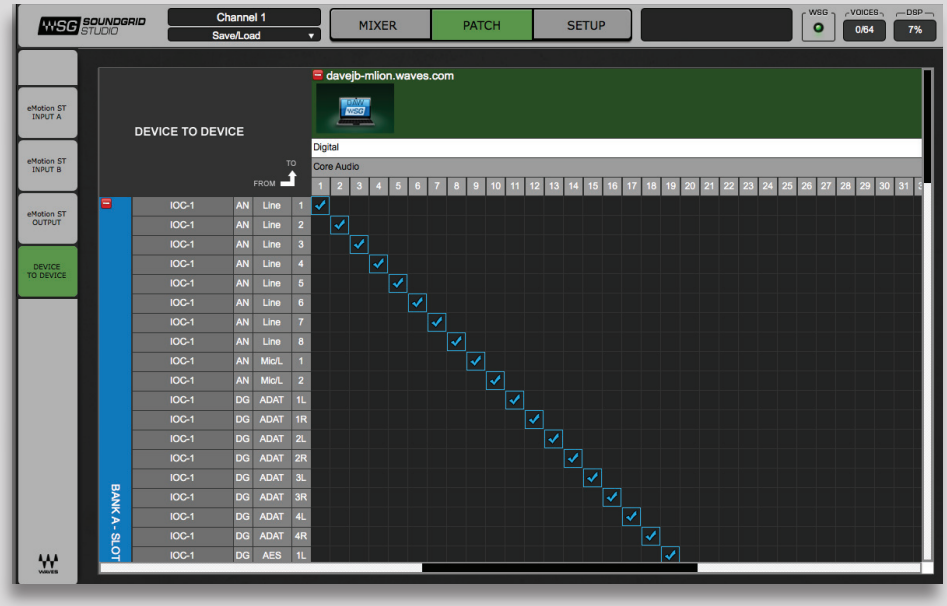
7.2 Patching I/O to Driver and Driver to I/O

When streaming audio to and from an IOC and a DAW, you must assign IOC inputs and outputs to the SoundGrid ASIO/Core Audio driver. (Alternatively, you may choose to monitor through the eMotion ST mixer. We'll cover that option later in this section.)

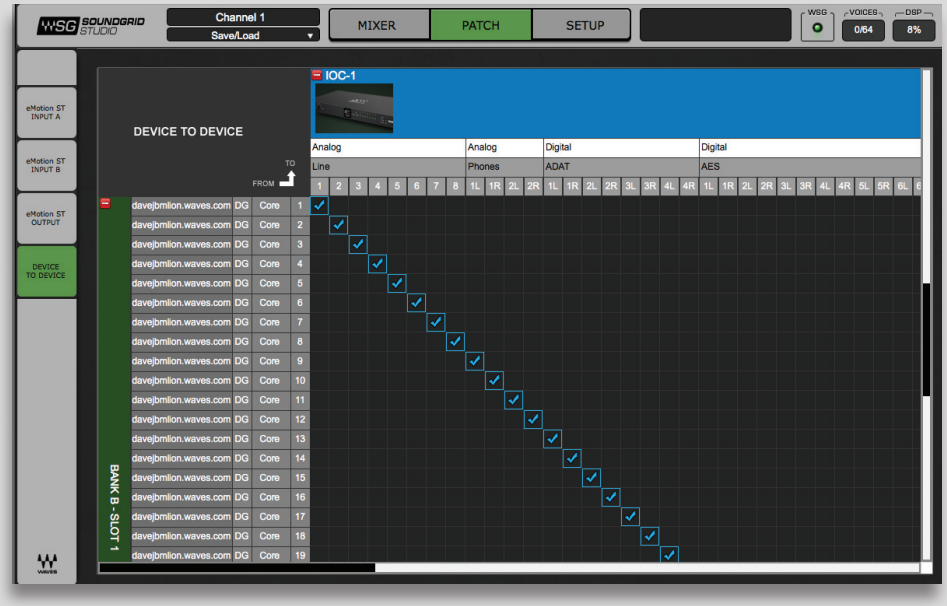
In the SoundGrid Studio Patch page, select the Device-to-Device tab. All device and driver channels are shown along both the horizontal and vertical axes. To make a standard "ascending patch" connection, draw the cursor in a diagonal line as shown below. To create a customized patch, click on individual cells. There are many ways to patch devices, but normally IOC inputs are patched to the ASIO/Core Audio inputs for recording. For playback, the patches are opposite, unless you choose to patch to the eMotion ST mixer for monitor mixing.

Once again, if you set up your system using the Wizard, you will not need to do any of this.

Patching from IOC to driver (input to DAW)

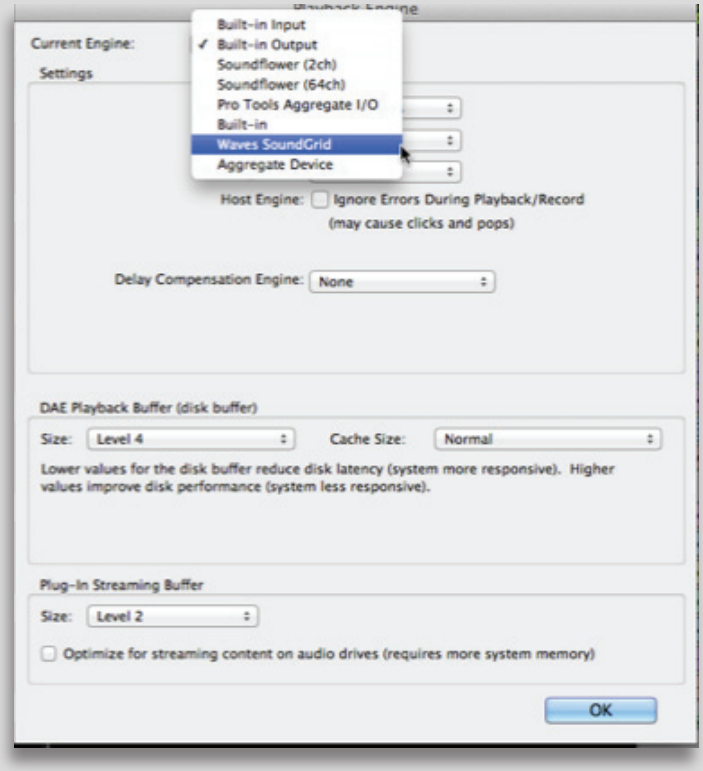


Patching from driver to IOC (output of DAW)



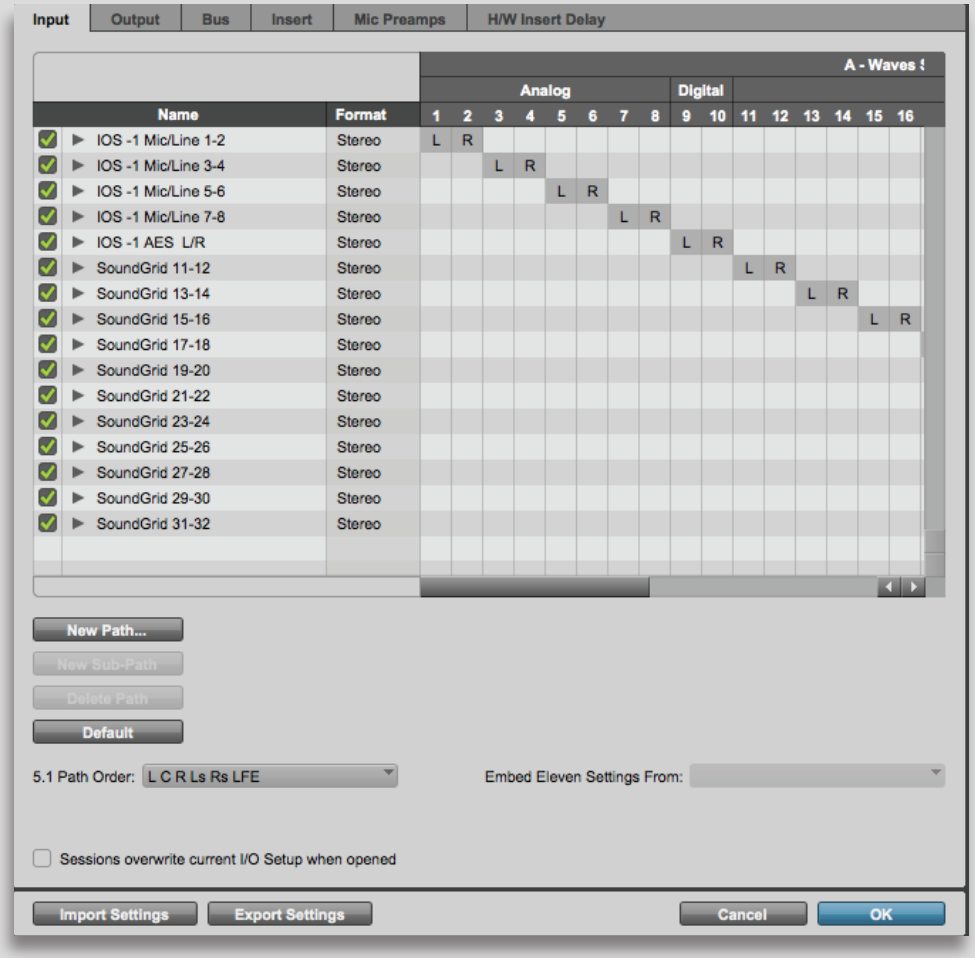
Selecting the Driver in the DAW

When a DAW is part of a SoundGrid network, the SoundGrid ASIO/Core Audio driver must be its playback engine. Choose **Waves SoundGrid** from among your playback engine options.

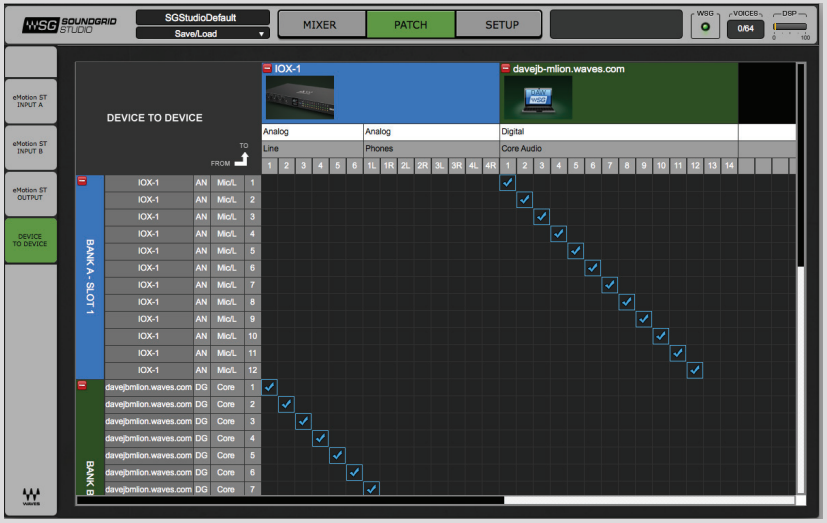


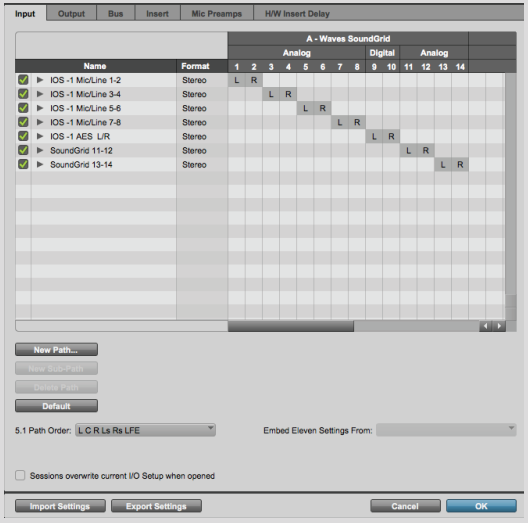
DAW I/O Setup

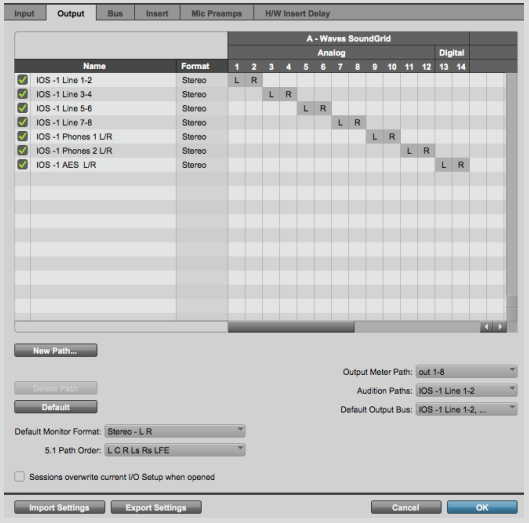
When you look at the I/O setup page of your DAW, what you see are driver channels whose default names represent what they are connected to. What they are connected to is determined in the Patch page of the SoundGrid Studio application.



Note the relationship between the SoundGrid Studio Patch page and the DAW I/O Setup page.





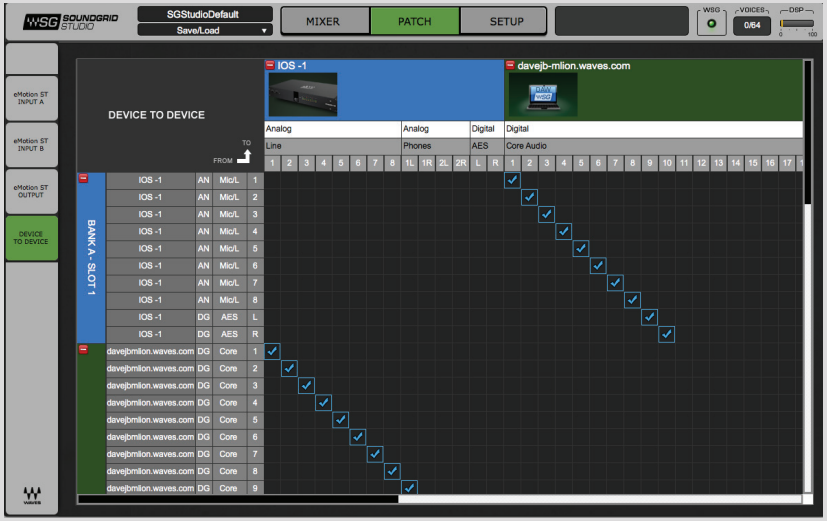


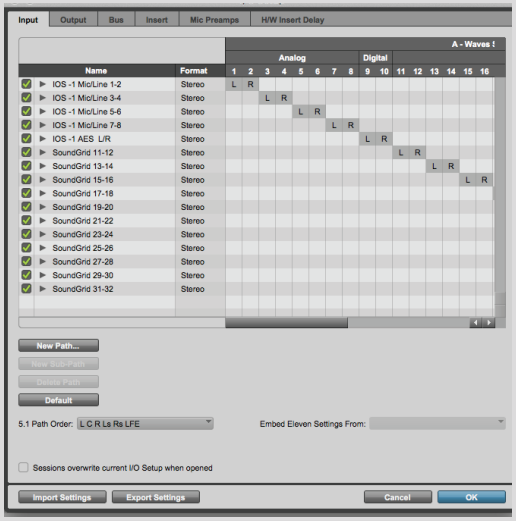
In the Patch page (left), IOC analog channels are patched to driver channels 1–34.
The arrow on the upper left of the Patch indicates that signal flows from the IOC to the driver.
Now look at the DAW I/O. The 34 driver channels appear at the top, and are patched to DAW input channels 1–34.

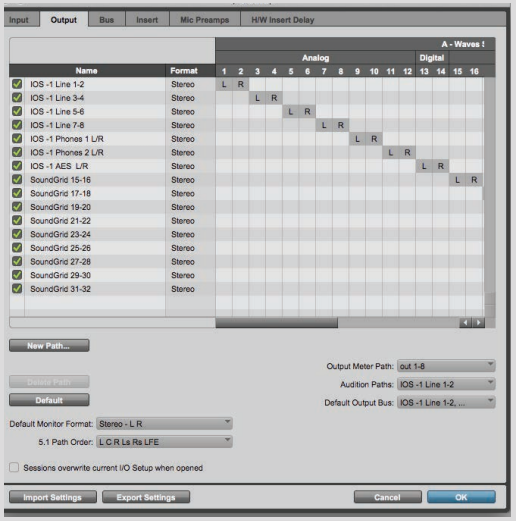
Driver Channel Names in your DAW

SoundGrid Studio patches from the Waves SoundGrid ASIO/Core Audio driver to a hardware I/O device, a secondary driver (another computer), or the eMotion ST mixer.

SoundGrid Studio transmits these names through the driver to the DAW. These will appear as the default names within your DAW. Most DAWs allow you to change the naming manually. For example, you may a DiGiGrid IOS with a total of 10 inputs (8 analog, 2 digital) and 14 outputs (8 analog, 2 digital, and 2 stereo headphone outputs). When these inputs and outputs are patched to and from the local driver (I/O to DAW, DAW to I/O), you will see the following in the Connection or IO setup within your DAW:



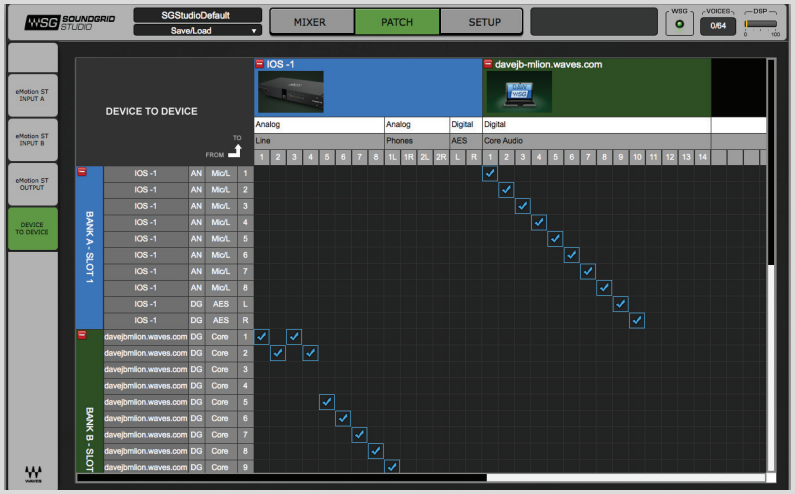


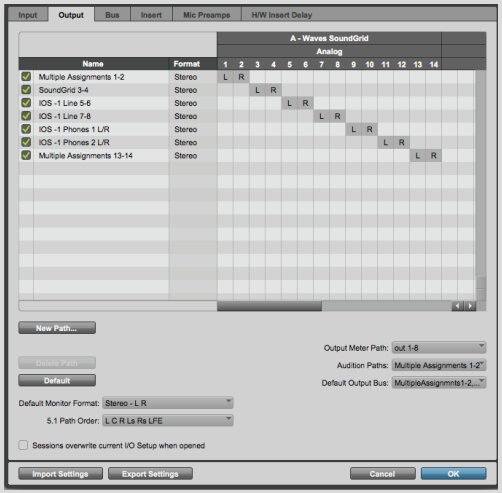


Local driver channels that are not patched to a hardware device or to the eMotion ST mixer will appear as SoundGrid 1, SoundGrid 2, etc.

Note: This transmission occurs while you launch your DAW and the driver handshakes with it. This means that any change of I/O name or eMotion ST channel name will not be visible in your DAW until you relaunch it. Some DAWs, such as Cubase, will let you reset the connection to the driver, saving you the need to relaunch the application.

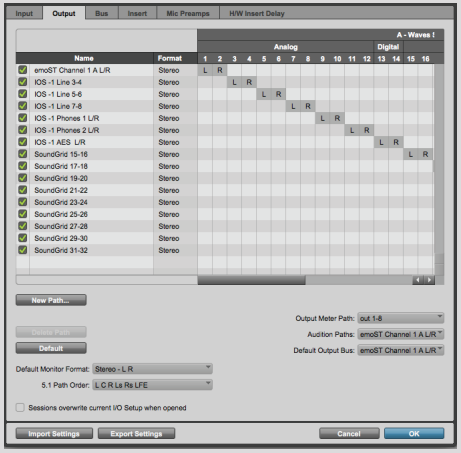
Important: DAW outputs through the driver can be patched to mutilple destinations; for example, the DAW's Main out can go to your Hardware Channel 1 & 2 as well as to Hardware Channel 3 & 4. In such a case, the name of the driver channel will be "Multiple Assignments." In this case we suggest you manually name these driver channels.



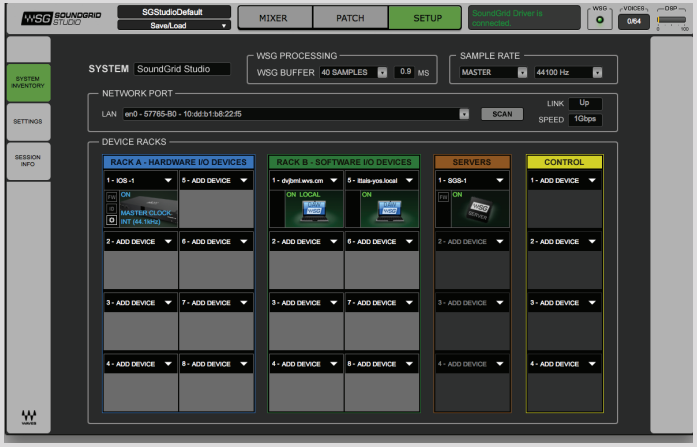


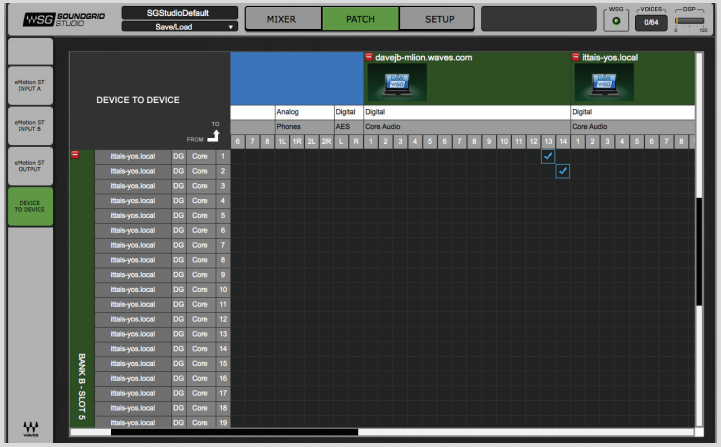
As mentioned above, driver channels can be connected to the eMotion ST mixer or to a secondary remote driver.

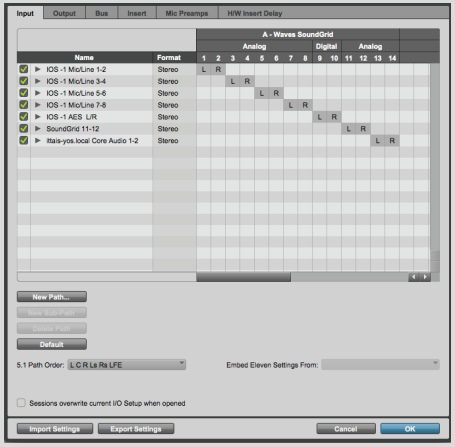
Here is an example of the DAW outputs patched to the eMotion ST mixer:



Here is an example of your DAW receiving input from another DAW on a secondary computer via networking:



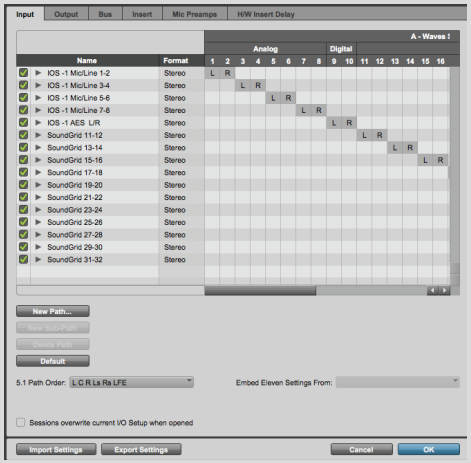




To ensure that the names have been updated in your DAW, you may need to follow certain steps, depending on your DAW. Here are a few examples.

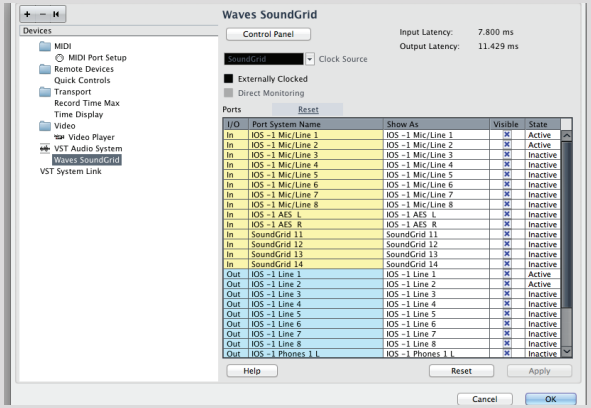
Pro Tools

Go to Setup > I/O
Delete and reset all I/O configurations to DEFAULT.



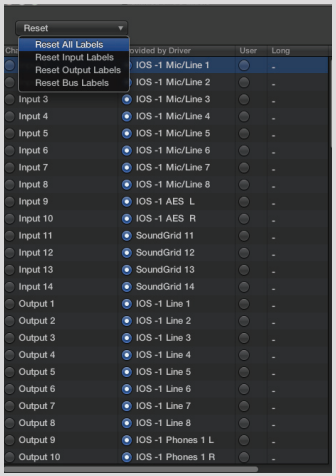
Cubase

Go to Devices > Device Setup > Waves SoundGrid.
Select RESET above the PORT System Name table.



Logic

Go to Mix > I/O Labels.
Select Reset All Labels.



Multiple Client Core Audio/ ASIO Driver

The Waves SoundGrid ASIO (Windows) or Core Audio (Mac) driver lets you configure multiple hosts with the same local driver. This means you can use multiple DAWs on the same computer simultaneously. This allows you to record the same source to two DAWs on the same computer consecutively; route audio from multiple DAWs to a single I/O; and, if you have a SoundGrid server, route multiple DAWs to the eMotion ST mixer.

Please note the following when using this feature:

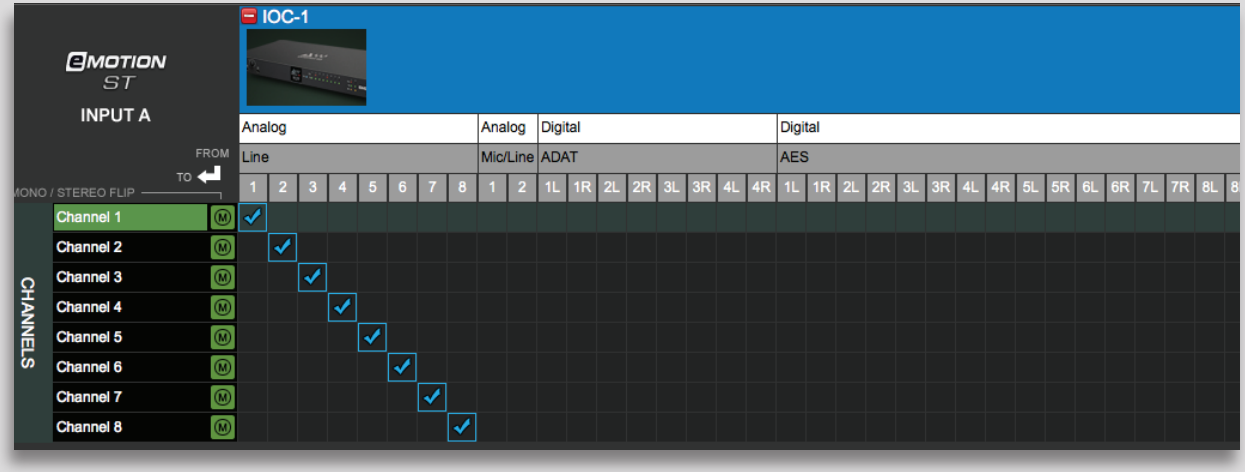
1. All hosts must run the same sample rate. If sample rates do not match, each host will behave differently.
2. Driver inputs can be shared by multiple DAWs.
3. Driver outputs are exclusive on PC computers running Windows: if a certain driver channel output is used in DAW A, it cannot be used in DAW B. Driver outputs are not exclusive on Mac computers: the driver's operating system layer is able to mix these channels.

   On PC computers running Windows, this limitation requires that you allocate driver channels manually between your DAWs. Choosing a driver output in a DAW will overwrite previous selections. For example, if you choose Main out in Cubase to be Driver Channel 1 and 2, you should choose the Main output in Ableton Live to be 3 and 4: if you choose 1 and 2 in Ableton Live, the Cubase output will be canceled.

   Please note: Some hosts, for example Pro Tools and MultiRack Native, automatically claim all driver outputs. Even when using such hosts, however, you can use the same input driver channels to record to multiple DAWs.
4. It is not possible to connect local driver channels to one another. This means you cannot use SoundGrid Studio's device-to-device patch to virtually connect audio between two hosts on the same computer. To do this, you must route through the eMotion ST mixer (which requires a SoundGrid server).
5. You may use up to five hosts on a single computer/driver.

7.3 eMotion ST Mixer Patching

The eMotion ST mixer enables you to create studio monitor mixes as well as personalized headphone mixes. Patch to and from the mixer using the eMotion ST input and output tabs on the left side of the interface. The green buttons indicate whether a channel is mono, left side of a stereo pair, or right side of a stereo pair. Toggle between these states by double-clicking on the button.



To learn more about patching between devices or to and from the eMotion ST mixer, please refer to the SoundGrid Studio Application user guide.

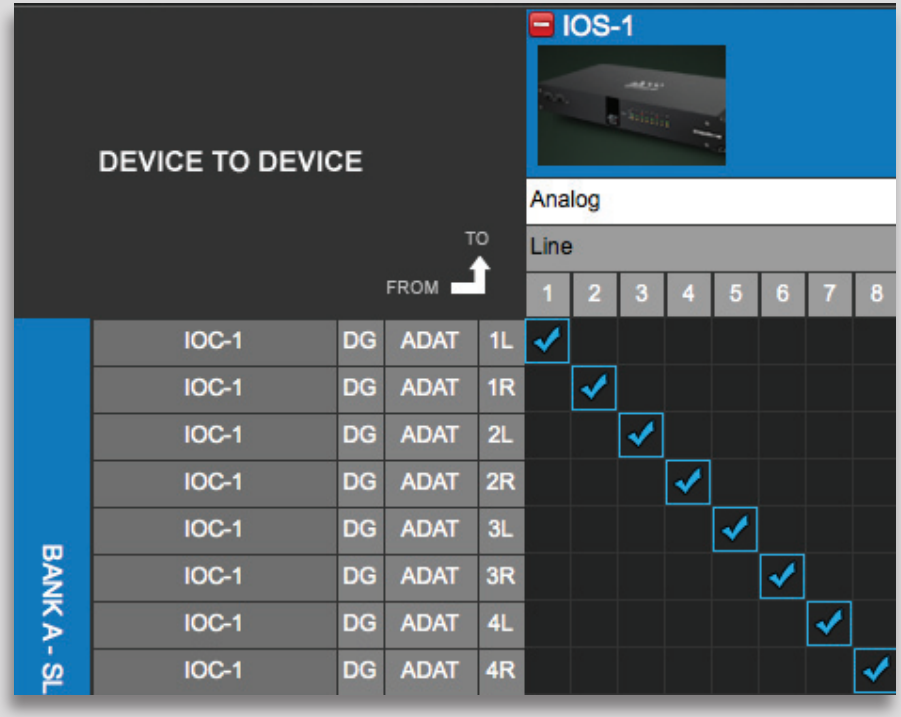
A few things to remember about the Patch page:

- All available devices and driver channels will appear in the patch. The number of channels depends on devices and connections.
- Patch direction is indicated by an arrow on the left side of the patch.
- Establish a patch by clicking on a cell, or by dragging across several cells. Remove a patch by clicking on it again.
- An output can patch to two inputs. An input can accept only one source.

Use the tabs on the left to choose among the patch options.

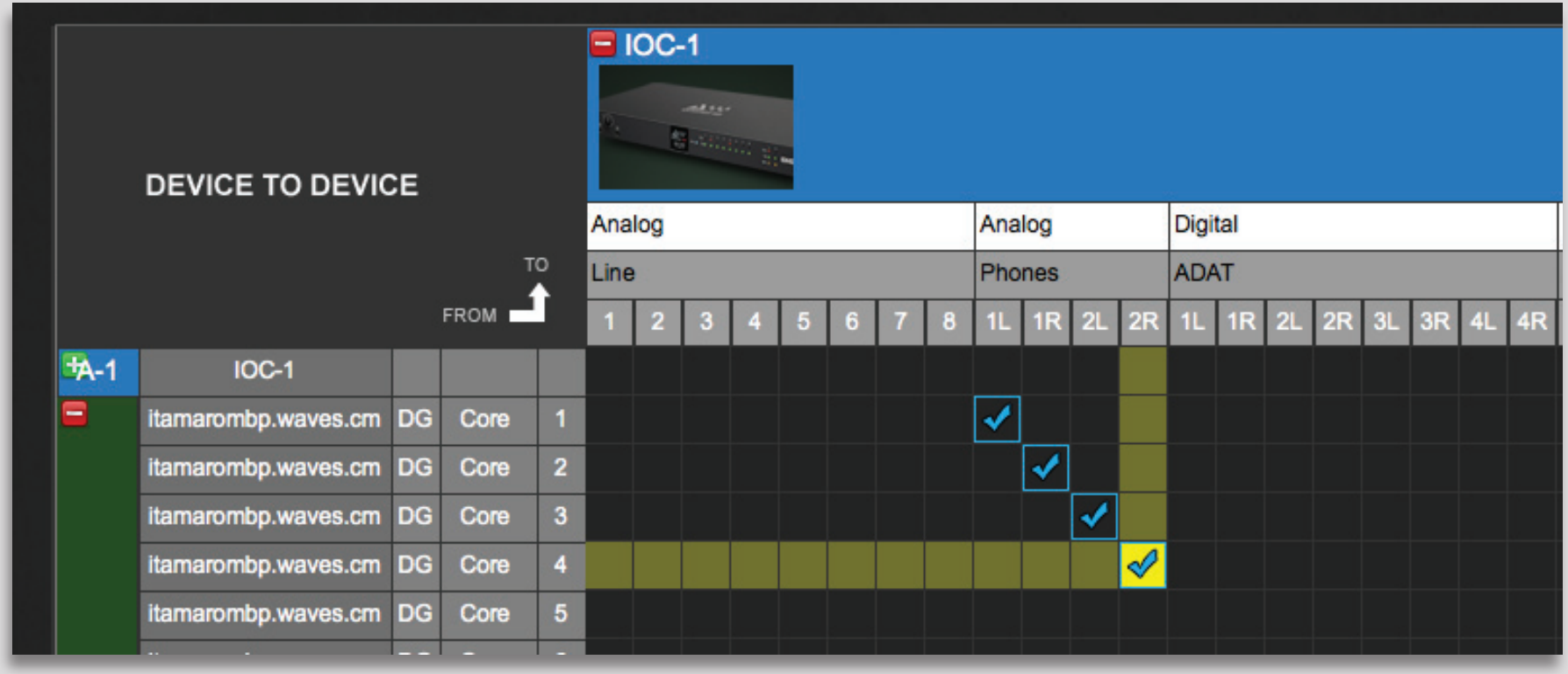
7.4 Device-to-Device Patching

Choose this view to patch devices and drivers to each other. All device and driver channels are shown along both the horizontal and vertical axes. There are many ways to patch devices, but normally IOC inputs are patched to the ASIO/Core Audio inputs for recording. For playback the patches are opposite, unless you choose to patch to the eMotion ST mixer for monitor mixing.
For further details, refer to the SoundGrid Studio Application user guide.



7.5 Headphone Patching

IOC has 2 independently adjustable headphone jacks. These appear on the Patch page after the 8 analog output channels. Adjust headphone levels on the IOC front panel.



8. TECHNICAL SPECIFICATIONS

General

- 1U rack-mounted (standard 19" rack-mount wide, 4U high, 380-mm deep excluding connectors)
- Supported sample rates: 44.1, 48, 88.2 and 96 kHz (176.4 and 192 kHz will be supported in the future)
- 2 mic inputs (XLR/TRS combo)
- 8 line inputs (25-pin DB25)
- 8 line outputs (25-pin DB25)
- 16 AES/EBU I/O (2x 25-pin DB25)
- 1 ADAT I/O: 8 channels @ 48 kHz (4 channels @ 96 kHz and 2 channels @ 192 kHz will be supported in the future)
- 2 headphone outputs with analog level knobs
- Word Clock I/O
- Clock synchronization via Word Clock input, AES/EBU, SoundGrid (SoE), Internal
- 2 SoundGrid ports (RJ45s)
- Reset switch

Analog Inputs

- Input Impedance: Mic: 2K5 / Line: 8K0 Ohms
- Gain Range: Mic: 0 dB to 52.5 dB in 7.5-dB steps
  Fine control provides further 0 dB to 7 dB in 0.5-dB steps
- Maximum Input Level: Mic: +26 dBu / Line: +36 dBu
- Mic Equivalent Input Noise: > -126 dB (150 Ohm source, gain +59.5 dB)
- Harmonic Distortion: Typically < 0.01% @ unity gain, -10 dB input @ 1 kHz
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)

Analog Outputs

- Maximum Output Level: +22 dBu
- Residual Output Noise: < 90 dB (20 Hz to 20 kHz)
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Output Impedance: 50 Ohms
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)
- Harmonic Distortion: Typically < 0.01% @ unity gain, -10 dB output @ 1 kHz

XLR Connectors

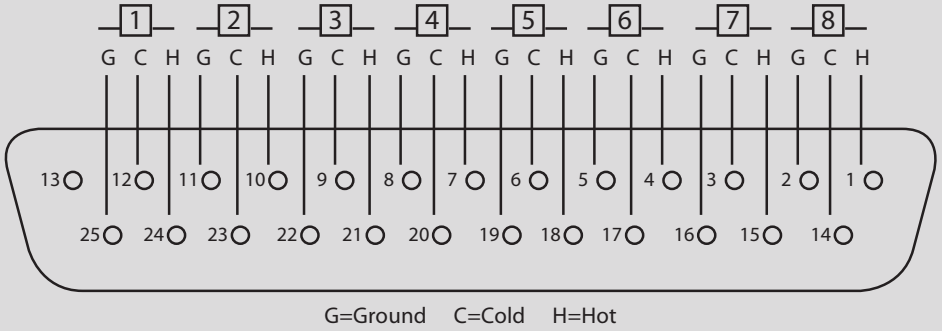
Phase	Termination Point
Positive (+)	Pin 2
Negative (-)	Pin 3
Signal Ground	Pin 1
Chassis Ground	Case

¼" TRS Connectors

Phase	Termination Point
Positive (+)	Tip
Negative (-)	Ring
Signal Ground	Sleeve

IOC Analog Connectors

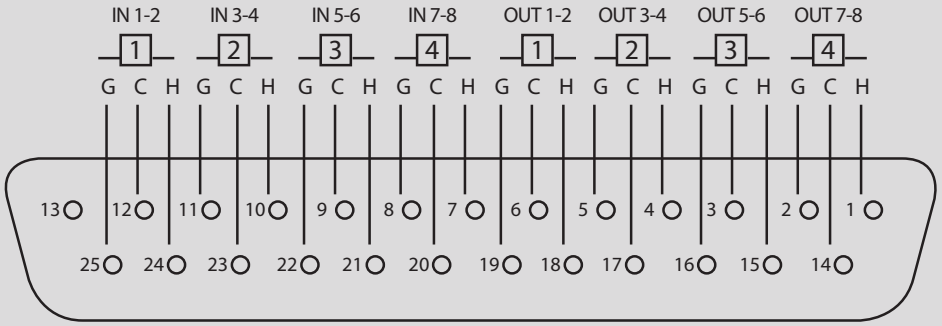
DB25 8-channel balanced connector AES59-2012



G=Ground C=Cold H=Hot

IOC AES Connectors

DB25 8-channel balanced connector AES59-2012



G=Ground C=Cold H=Hot

8.1 Installation Notes

The IOC unit must be earthed to the mains earth (ground) and installed according to the safety instructions included with the unit. The unit is powered from an IEC inlet on the rear. This must be connected to an earthed mains outlet using a cable that complies with local approvals and regulations.

Approvals cover use in ambient air temperature of up to 35°C. Operation in higher temperatures should be avoided. A 1U space should be left above and below the unit to prevent heat transfer from adjacent equipment, if this generates heat above 35°C.

At least 75 mm (3 inches) should be allowed to the sides of the unit to allow ventilation. At least 75 mm (3 inches) of free air should be left at both the front and the rear sides of the rack to allow heat dissipation. Under no circumstances should the fan (where fitted) or ventilation outlets be blocked or restricted.